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Analog studies of thermomechanical fatigue and abrasive wear of cast and forged steels for "autoforge" dies

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Abstract

Processes of thermomechanical fatigue and abrasive wear of suspension-cast precipitation-hardening ferrite-carbide steel 30T6NTiC-1.5 and standard steel 4Kh5MFS are studied. The dominant kinds of fracture typical for dies for semisolid stamping are determined. The factors and parameters of cyclic temperature and force loading are shown to produce a selective action on the competing kinds of damage of the die steels. A comparative analysis of the properties of the steels is performed. Steel 30T6NTiC-1.5 is shown to have substantial advantages over steel 4Kh5FMS traditionally used for making "Autoforge" dies. © 2014 Springer Science+Business Media New York.

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Keywords

abrasive wear, criteria of cyclic viscosity, dies for semisolid stamping, dimensionless criteria of similarity, dominant kinds of fracture of dies, loading factors, performance functional, suspension-cast steel, thermomechanical fatigue